Enzymes Help Us Digest Food: Teacher’s Guide

1. Purpose

The purpose of this lab is to have students explore the nature of enzymes and allow them to observe visually how they work and what they do.

1. Concepts

-Di/Monosaccarhides

-The active site

-Enzyme, Substrate, and Products in a specific reaction

-Enzyme Specificity

-Lactose Intolerance

-Molecules that make up Lactose and Sucrose, along with milk.

1. Objectives

TSWBAT…

1. Recognize the difference between disaccharides and monosaccharides.
2. Identify the substrate, enzyme, and products of a reaction.
3. Identify the two monosaccharides that make up Lactose.
4. Define what an enzyme is and its structure and function.
5. Explain how sugars are broken down and digested.
6. Illinois Standards:

Stage I: 12A:

2. Apply scientific inquiries or technological designs to analyze the cellular organelles and functions, using different microscopic techniques, explaining functional processes chemically and structurally (e.g., osmotic, active and facilitated transport, enzyme action and protein/lipid/carbohydrate metabolism).

1. Materials Needed

Per Group (2 students)

1. one Graduated Cylinder
2. 5 test tubes
3. one test tube rack
4. 5 glucose strips
5. one marker
6. tape
7. 1mL pipet
8. 20mL lactose solution
9. 10L of sucrose solution
10. 3mL of lactase solution
11. 20mL of milk
12. Gloves
13. Goggles
14. Preparation Guide:

Lactose Solution:

5g lactose in 200mL water

Sucrose Solution:

5g sucrose in 200mL water

Milk (20mL per group)

Lactase Solution:

1g lactase in 50mL water

1. Individual Lab Set Up:

Teacher should put all materials needed per group on a tray at the lab stations being used. Except for the solutions, which will be at the front of the classroom for the students to obtain on their own.

1. Time/Length of lab:

The lab should take 45 minutes, along with 20 minutes before the lab to prepare solutions and set up materials needed.

1. Safety Issues:

The students will use goggles to be sure they do not get any of the solutions near their eyes. Also, they will be required to wear gloves so their skin does not come in to contact with the solutions too.

1. Pre-Lab Discussion Guide:

First ask students what an enzyme is, and then what the importance of a digestive enzyme is. Once they answer it will lead in to the guided questions on their handout that they will complete before the first experiment.

1. Post-Lab Discussion Guide:

The students will complete the questions at the end of the lab and we will discuss these answers as a class.

1. Adaptations for Students with Special Needs:

The teacher should bring the solutions to their lab station with the amount needed. Instead of just giving them questions to answer in the lab the teacher should provide background information to help them answer the questions.

1. Lab Diagram (set up for class of 28 students)

-Students are to work in pairs for this laboratory, if there is not enough stations, there can be groups of three.

-To make the solutions, the ingredients should be tripled.

All of the following should be ready for each of the student groups prior to the lab:

* one 25mL graduated cylinder
* 5 test tubes
* a test tube rack
* 5 Glucose strips
* a marker and tape for labeling test tubes
* a 1mL pipet
* goggles and each student will need a pair of gloves.

-The solutions should be located at the front of the classroom

-Students should clean all glassware used at the end of lab and place it back at their stations on the tray.

-Use glucose strips, gloves, paper towels, etc. should be thrown away at the end of lab.